

Natural Background Soil Metals Concentrations in Washington State

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Executive Summary

This report contains information on the natural background concentrations of metals in surficial soil throughout Washington State. The objective of this study was to define a range of values that represent the natural concentration of metals in surficial soils throughout Washington. The results of this study represent the culmination of a seven-year effort by Ecology (Toxics Cleanup Program) and its co-sponsor, the USGS Water Resources Division (Tacoma Office).

Upon the completion of a small pilot project (Big Soos Creek Drainage Basin, King County, 1987), Washington was divided into 24 distinct regions based on differences in geology, soils, and climate. Twelve of these 24 regions were then selected for a statewide assessment of Washington. *These 12 regions were selected because they represent the major urban, industrial, and highly developed core areas in Washington, which is where most cleanup sites are located.* Soil samples were then collected from the predominant soil series in each of the 12 regions, with a total of 490 soil samples collected from 166 locations throughout Washington. An effort was made to collect samples from undisturbed or undeveloped areas. Samples were collected from the "A," "B," and "C" soil horizons at each sampling location (ground surface to a depth of 3 ft.). Each sample was analyzed for total metals content.

The results of this study found that the soil metals concentrations in Western Washington were on average slightly higher than Eastern Washington. The population, climate, and vegetation of Western Washington are thought to be the primary reasons for this variation. The variation in west-to-east data are more pronounced when the 90th percentile values are compared (see **Table 1** below). The one exception was arsenic, whose east-side 90th percentile value was 15% higher than the west. Statewide and regional 90th percentile values are presented in **Table 1** below.

Table 1: Statewide & Regional 90th Percentile Values¹

Errata: values shown in green below are corrections to the original Table 1 (the values had been reversed).

	Al	As ²	Be	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Ni	Z _n
State Wide	37,200	7	2	1	42	36	42,100	17	1,100	0.07	38	86

Puget Sound	32,600	7	0.6	1	48	36	58,700	24	1,200	0.07	48	85
Clark County	52,300	6	2	1	27	34	36,100	17	1,500	0.04	21	96
Yakima Basin	33,400	5	2	1	38	27	51,500	11	1,100	0.05	46	79
Spokane Basin	21,400	9	0.8	1	18	22	25,000	15	700	0.02	16	66

¹ All Values = mg/kg and represent total-recoverable analysis.

² Graphite furnace atomic absorption (GFAA) analysis.

Errata: The lead 90th percentile values on p. 7-13 (Fig 18) of the main document are reversed for both Clark and Puget Sound basin, e.g. the correct lead value for Puget Sound is 24.02 ppm. The correct value for Clark County is 16.83 (they are reversed in the table).

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